

I. Anticipation Rejections

The Examiner rejected Claims 34, 38 and 46 as being anticipated by Tsutsui. This rejection is respectfully traversed.

Independent Claim 34 is directed to an etch resistant masking layer, which comprises a layer of material resistant to vapor hydrogen fluoride etchant having an opening therethrough to expose a portion of an underlying layer such that the portion can be etched by vapor hydrogen fluoride etchant. This claim is not anticipated by Tsutsui. Tsutsui does not disclose (or in any way suggest) an etch resistant masking layer resistant to vapor hydrogen fluoride etchant that has an opening therethrough to expose a portion of an underlying layer that can be etched by vapor hydrogen fluoride etchant. The Examiner contends that the WSi and gold layers 7, 8 shown in FIGURE 1 of the reference form the claimed mask. However, the WSi and gold layers are not a mask and do not have any type of opening therethrough, much less an opening therethrough to expose a portion of an underlying layer that can be etched by vapor hydrogen fluoride etchant. In the final office action, the Examiner states that "to the left and right of the WSi and gold structure, there are openings that expose the underlying silicon oxide layer that is etched by vapor HF." The Examiner is assumed to be referring to the indented portions on the left and right sides of the WSi and gold structure as the claimed openings. Even if these indentations are considered openings, neither is an opening therethrough, i.e., neither "opening" extends through a layer of material resistant to vapor hydrogen fluoride etchant as required by the claim. What the Examiner refers to as openings are merely indentations that extend only partially into the sides of WSi and gold structure and not therethrough.

Furthermore, as discussed below, the WSi and gold structure disclosed by Tsutsui is not a masking layer, and accordingly would have no reason for having an opening therethrough for purposes of etching.

Claim 34 is therefore clearly not anticipated by Tsutsui. Claim 38 depends on Claim 34 and is also not anticipated by Tsutsui.

Claim 46 specifies a masking layer resistant to vapor hydrogen fluoride etchant having an opening therethrough. Claim 46 is also clearly not anticipated by Tsutsui.

The rejections of Claims 34, 38 and 46 as being anticipated by Tsutsui should therefore be withdrawn.

II. Obviousness Rejections

The Examiner rejected Claims 9, 11, 27, 28, 29, 31-33, 35, 36, 40, 42, 44, 45, 47 and 48 as being obvious over Tsutsui in view of Farnworth.

Independent Claim 9 is directed to a mask comprising a layer of patterned polyimide for vapor hydrogen fluoride etching. The Examiner contends that Tsutsui discloses the use of WSi and gold layers that are resistant to vapor hydrogen fluoride, and which form a mask. The Examiner also states that Tsutsui discloses in col. 2, lines 10-25 that the mask can comprise a patterned photoresist that is used to pattern a tungsten layer. The Examiner acknowledges that Tsutsui does not teach that the photoresist comprises polyimide. Farnworth is, however, said to disclose photosensitive materials including polyimides in col. 6, lines 50-60. The Examiner states that the Tsutsui and Farnworth references are analogous art as they are drawn to patterning semiconductor layers using photosensitive and etching processes, and that it would have been obvious to one of ordinary skill in the art to use Farnworth's polyimide material in Tsutsui's mask.

In the first passage of Tsutsui cited by the Examiner (col. 2, lines 10-25), Tsutsui discloses a prior art method of selectively etching a metal film 9 "by means of the usual

photolithography and dry etching method using a photoresist as a mask." No use vapor hydrogen fluoride etchant is disclosed or suggested here by Tsutsui.

In the second passage of Tsutsui cited by the Examiner (col. 5, lines 14-18), Tsutsui discloses the silicon film 6 is vapor phase etched by gases including a vapor of HF, and the silicon oxide film 6 is removed as shown in FIGURE 1(c). The Examiner contends that the WSi and gold layers 7, 8 form a mask with respect to this etching. The WSi and gold layers 7, 8 however are not used by Tsutsui as a mask because (1) they are not structured to enable any selective etching of the silicon film 6, and (2) they form part of the final structure as a gate electrode and are not later removed. The Examiner states that the term mask is not so defined in the original disclosure. The term mask, however, is well known with reference to etching processes to mean a structure that permits selective removal of material underneath the structure. The WSi and gold layer structure permit no selective removal of material; all of the silicon oxide film 6 beneath and around the WSi and gold layer structure is removed because it is not a mask and is not designed to permit any selective material removal.

Furthermore, neither cited teaching of Tsutsui is properly combinable with Farnworth. The first cited teaching of Tsutsui does not disclose or suggest use of vapor hydrogen fluoride etchant. Thus, even if this teaching is combined with Farnworth, each and every element of Claim 9 would not be present, making this an improper rejection under § 103. The second cited teaching of Tsutsui discloses WSi and gold layers 7, 8 which, as indicated above, are not used by Tsutsui as a mask for selective material removal, much less as a photoresist mask. Thus, one skilled in the art would not look to any other reference for any teaching of any particular type of a photosensitive mask to combine with this teaching of Tsutsui.

In addition, Farnworth also does not suggest combination with Tsutsui. Farnworth is directed to a method for attaching a semiconductor die to a leadframe

using a patterned adhesive layer. Farnworth teaches in col. 6, lines 50-61 that the adhesive layer could be formulated from photosensitive materials known generally as polyimide siloxanes. A mask is used to form the pattern on the adhesive photosensitive materials. The adhesive layer formulated from polyimide siloxanes is therefore not the mask. Accordingly, one skilled in the art would not consider combining the teachings of Farnworth relating to adhesive materials with that of Tsutsui. The Examiner states that Farnworth was cited for teaching the general step of patterning a polyimide photosensitive layer on a semiconductor wafer through a mask or reticle, and that patterning polyimide photoresist coated semiconductors is common in the art. However, this still does not address the fact that in Farnworth, a mask is used to form the pattern on the adhesive photosensitive materials. The adhesive layer formulated from polyimide siloxanes is not itself a mask, but only made using a mask. Thus, even if Tsutsui's WSi and gold layers arguably form a mask, one skilled in the art would not consider replacing this structure with Farnworth's adhesive materials, which are not a mask.

Therefore, the teachings of Tsutsui and Farnworth are not properly combinable, and the rejection of Claim 9 and its dependent claims should be withdrawn.

Independent Claim 27 and 40 are similarly allowable over the combination of Tsutsui and Farnworth.

The Examiner also rejected Claims 9, 10, 12, 27, 30-33, 35, 37, 40, 43-45, 47, and 49 unpatentable over Tsutsui and Cloud. The Examiner states that while Tsutsui does not teach that the mask comprises non-photosensitive polyimide, Cloud teaches the use of polyimide in an integrated circuit structure. In particular, the Examiner states that Cloud teaches use of buffer layer 21 for (1) enhancing the strength of a tip 13, and (2) impeding the etching progress into the layer on which the buffering material is deposited. This teaching is not properly combinable with Tsutsui because the WSi and



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Response to Office Action dated February 10, 2004

Reply to Office Action dated September 17, 2003

gold layers that the Examiner seeks to replace with the buffer layer are intended to perform neither function, i.e., the WSi and gold layers do not (1) enhance the strength of the structure, nor do they (2) impede the etching progress into the layer on which they are deposited. There is simply no teaching of these functions, or even any recognition of any need for them in Tsutsui. Tsutsui is thus not properly combinable with Cloud because one skilled in the art would have no motivation to combine the references in the manner suggested by the Examiner. These rejections should therefore also be withdrawn.

Claims 9-12, 27, 29-40, and 42-50 are pending in the present application. As the application is now believed to be in condition for allowance, issuance of a Notice of Allowance is respectfully requested.

Respectfully submitted,

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February 10, 2004

Attorney Docket No.: 100718-124 (MIC-58DV2)